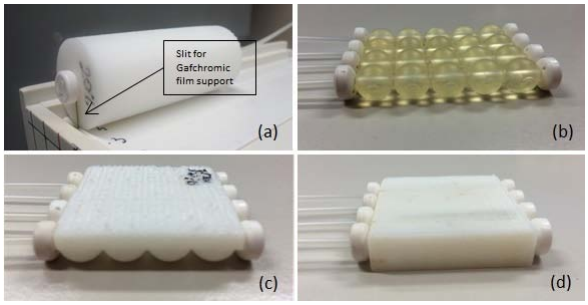
with the catheter channel and was printed with 20% infill percentage. The test configurations had the radiochromic slit at 6.3 mm distance from the center of the catheter channel and were printed with 20% (Test 1) and 40% (Test 2) infill percentage. Physical quality of ABS plastic were evaluated by analyzing the depth dose profiles measured by Gafchromic EBT3 films (International Specialty Products, Wayne, NJ) when the 192Ir source passing through the catheter channel delivered 2 Gy at 10 mm distance from the axis of the channel (Fig.1a).
Four skin mould applicators with 4 parallel catheter channels of 2.5 mm diameters, 5 mm distance between the axis of the channel and the surface, and 10 mm distance between consecutive channel axes were 3D-printed. Two geometrical shapes were compared to the commercial Freiburg Flap applicator (Nucletron, Stockholm, SE, Fig. 1b): a group of 16 semi-spheres reproducing the actual Freiburg geometry printed at 10% infill percentage (Fig.1c) and a parallelepiped applicator with 10%, 20% and 40% infill printing percentage (Fig.1d). A prescription dose of 2 Gy to the surface at 5 mm distance from the channels axes was delivered using an 192Ir source. Surface dose distributions were measured with Gafchromic EBT3 films for both the 3D-printed skin mould applicators and the commercial Freiburg Flap applicator considered as reference. The gamma index method with dose difference (DD) criteria of 3%, distance-to-agreement criteria (DTA) of 3 mm and 10% dose threshold was evaluated.



Results: The radiation attenuation profiles were comparable in all the cylindrical configurations. Dose attenuation were not sensitive to the density of the material (Tab.1a). When comparing 3D-printed skin mould applicators with commercial Freiburg Flap in terms of gamma index analysis, a high pass rates >90% was obtained. Therefore, the isodose overlay and linear dose profiles of film measured using 3D printed applicator and commercial Freiburg were in close agreement (Tab.1b).

(a) Cylindrical Applicator		Profile dose distribution			
		Source distance			
		10 [mm]	15 [mm]	20 [mm]	25 [mm]
Measured Dose [Gy]	Reference configuration	2.0	1.4	1.0	0.8
	Test configuration ABS 20%	1.9	1.2	0.9	0.7
	Test configuration ABS 40%	1.9	1.2	0.9	0.7

(b) Skin mould applicators	Gamma analysis – passing rate –			
	3D printed Freiburg Flap ABS 10%	Parallelepiped ABS 10%	Parallelepiped ABS 20%	Parallelepiped ABS 40%
Commercial Freiburg Flap	97.74%	98.57%	98.03%	91.66%

Conclusion: ABS3D-printed applicators are a reliable solution for patient-specific HDR-BRT of superficial lesions. Further assessment of 3D printing techniques and materials are required for clinical development.

PV-0037

Application of brachytherapy for residual nasopharyngeal carcinoma after external beam radiotherapy

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Purpose or Objective: Local residual disease occurs in 7-13 % after primary treatment for nasopharyngeal carcinoma (NPC). To prevent tumor progression and/or distant metastasis, treatment is indicated. This studies focus on the application of 3D-CT based and endoscopical guided brachytherapy for the treatment of residual lesion in nasopharyngeal cavity of NPC after the radical external beam radiotherapy and to assess the safety and clinical outcome of this technical.

Material and Methods: 26 patients with stage T1-T2b NPC who suffered from locally residual lesion in nasopharyngeal cavity (All the tumors were less than 1 cm below the nasopharyngeal epithelium) after standard radical radiotherapy (70-74 Gy) ± platinum-based chemotherapy were further administrated by the 3D-CT based and endoscopical guided brachytherapy using the Foshan applicator or the standard nasopharyngeal applicator according the tumor location. The prescribed salvage dose of brachytherapy was 3.5 Gy/fraction, twice- daily with an interval of 6 h to a total dose of 7-14 Gy (one week apart) depending on the total dose of external beam radiotherapy. The total dose ranged from 81.8-85.6 Gy when transformed to EQD2 models, and the Pstem D1%< 60 Gy was restricted in planning. The primary endpoint was 1-, 3-year overall survival and secondary endpoints were: local control, distant metastasis and grade 3-4 adverse events.

Results: The whole brachytherapy procedure was well tolerated under local anesthesia. 24 patients (92.3%) get complete response (CR) as confirmed by enhanced CT/MRI after 1-3 month after the brachytherapy. With a median follow-up time of 40 months, no serious complications or late sequelae occurred. The 1-, and 3-year overall survival, locoregional free survival, and distant-metastasis free survival rates were 96.2%, 80.8%, 92.3% and 84.6%, respectively. And the patients with early-T stage at initial diagnosis had 100% local control rate.

Conclusion: Brachytherapy is of benefit to improve the local control of primary lesion of NPC with residual nasopharyngeal cavity involvement. It is a safe and effective approach for patients with poor tumor regression at the end of external beam radiotherapy for boosting the local irradiation dose.

PV-0038

Multivariable model development for mortality after total salvage Iodine-125 prostate brachytherapy

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Purpose or Objective: Total salvage Iodine-125 brachytherapy (TS I-125-BT) is a potentially curative treatment strategy for localized prostate cancer (PCa) recurrences after radiotherapy. Prognostic factors influencing PCa-specific and overall mortality (PCaSM & OM) are not known. The objective was therefore to develop a multivariable, internally validated prognostic model for survival after TS I-125-BT.

Material and Methods: Retrospectively, sixty-two TS I-125-BT patients were analyzed. These patients were treated from 1993-2010 in the Netherlands. Multivariable Cox-regression was used to assess the influence of pre-salvage characteristics on PCaSM and OM. Missing data was handled by using multiple imputation (20 imputed sets). Internal validation was done using 500 bootstrap resamples of every imputed set. Discriminatory ability was quantified with the C-statistic. Calibration plots were created to visually assess the